DOOSAN

Optimal Solutions for the Future

PUMA SMX series

Super
Multi-tasking
Turning center

PUMA SMX series

PUMA SMX2600
PUMA SMX3100
PUMA SMX2600S
PUMA SMX3100S

ver. EN 140829 WO

Contents

PUMA SMX series

PUMA SMX series, Doosan's next generation Multi-tasking Turning Center, features high productivity, high precision and easy operation. By integrating the capabilities of multiple machines into one system, the PUMA SMX series provides best in class machining capability by using multi-tasking functions which minimize the machining time and the number of machining operations. The PUMA SMX series also provides excellent performance for high precision machining by minimizing thermal deformation and applying an accuracy control feature based on multiple thermal compensation functions. Ergonomic design considering operator convenience and efficient maintenance provides an optimal solution that meets the customer's needs.

Higher Productivity through Powerful Multi-tasking Functions Decreases the total processing time and number of machining operations by using a single setup. This provides excellent high speed performance for component manufacturing processes which require accurate and complex machining.

- Complex machining capabilities of left spindle, right spindle, B-axis and milling spindle
- High-rigidity machine construction using structural analysis design
- Maximized Y-axis machining area through orthogonal design structure

Enhanced Precision through High Accuracy Control Functions
Maintains excellent precision during long-term machining processes by minimizing the thermal deformation of the spindle and the feed axis, and maximises precision through the 0.0001° axis resolution control function.

- Minimized thermal deformation of the spindle and feed axis using oil cooler
- Adoption of Roller LM Guideways with high-rigidity and high precision
- Equipped with 0.0001° B-axis and C-axis accuracy control function

Easy and Convenient Operation through an Ergonomic Design
Features excellent maintenance as well as usability and convenience through customized functions.

- Front located tool magazine
- Side-to-side movable swiveling operation panel with adjustable height
- Convenient ATC - MAGAZINE operation panel

Higher Productivity through Powerful Multi-tasking Functions

The powerful complex machining capabilities, such as left spindle, right spindle, B-axis and milling spindle of the PUMA SMX enable the manufacture of a variety of workpieces using a single setup, thus realizing maximum productivity by minimizing machining time, factory floor area and number of operators.

Optimal Solutions

Multi-tasking Functions

Saves time up to 75% by using one multiple-machining setup, including left spindle, right spindle, B-axis and milling when manufacturing small batches of various types of products.

Powerful Machining Capabilities

Rapidly enables high productivity machining processes for many applications utilizing various machining operations such as turning, end milling, face milling, drilling and tapping.

High-rigidity Machine Construction

Maintains high-rigidity thanks to structural analysis design, and performs high precision machining functions by applying a high speed spindle with high power / torque capability.

Large Machining Area

The extended Y-axis stroke using an orthogonal design structure enables machining of various large size workpieces due to the expanded machining area and turning diameter.

Multi-tasking Functions

Achieves high productivity equal to more than three standard machines because of the multi-tasking functions through left spindle, right spindle, B-axis and milling function that only require a single machining setup.

Various Benefits of Multi-tasking Turning Center

Using a single set up, one machine is capable of performing all machining processes that generally require two three or even more machines. By minimizing time and labor, the process cost is reduced and lead times are shortened by up to 75%. This provides a significant advantage when manufacturing small batches of a variety of products.

Reduced production lead time by

75 %

Reduced time and operator requirements and enhanced accuracy!

	Conventional machining process	PUMA SMX process
	Three machines	One machine
	Three operators	One operator
	One machine setup ≈ Move workpiece ≈ Another machine setup ≈ Move workpiece ≈ Another machine setup	One machine setup
	Floor space for at least three machines required	Floor space for only one machine

Enhanced Productivity for Manufacturing Complex Shape Parts

Faster machining time compared to many conventional machines provides superior productivity and machining capability.

Reduced production lead time by

75 %

	Conventional machining process	SMX2600S
	Machine 1 (Turning Center): -Setting, -Turning	-Setting, -Turning, -Milling, -Automatic feed, -Turning, -Milling
	-Remove and move workpiece	
	Machine 2 (Machining Center): -Setting, -Conventional Milling, -Change fixture for the angular surface machining, -Milling for the angular surface	
	-Remove and move workpiece	
	Machine 3 (Turning Center): -Setting, -Turning	
	650 Minutes	**163** Minutes

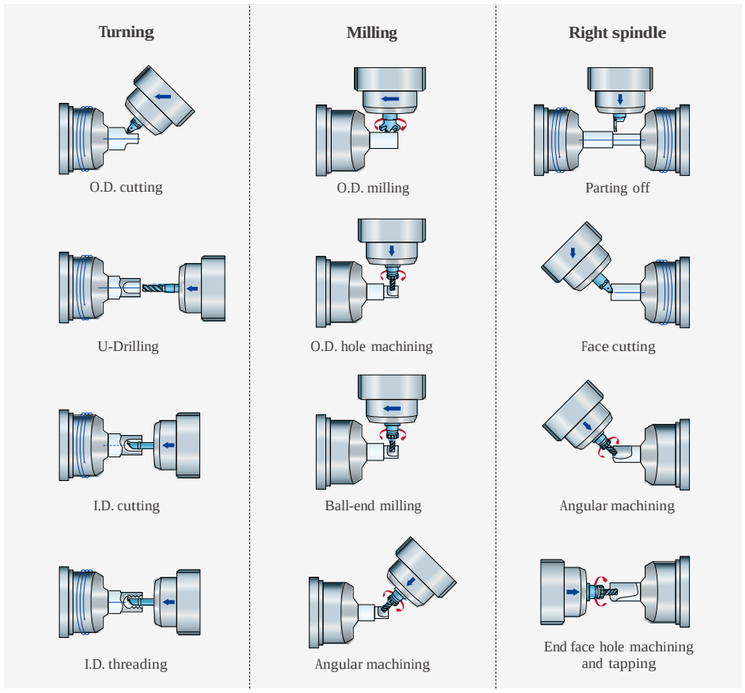
Increased work efficiency using one time setup on one machine

Powerful Machining Capabilities

Minimizes workpiece setup and provides superior machining performance through multi-tasking functions that are applied in one setup, such as turning, end milling, face milling, drilling, and tapping, etc.

Multi-tasking Functions Capable of Machining Variations

Complex machining functions using left spindle, right spindle, B-axis and milling spindle, facilitates the production of a variety of complex workpieces and achieves enhanced productivity using both high speed and heavy duty machining.



Powerful machining capability, such as turning, end milling, face milling, drilling, tapping, etc., facilitates the machining of a variety of workpieces.

O.D. cutting (PUMA SMX3100)

Spindle speed	Cutting speed	Feedrate	Radial cutting depth	Material removal rate
253 r/min	210 m/min (8267.7 ipm)	0.55 mm/rev (0.022 ipr)	8.5 mm (0.3 inch)	1405 cm^3/min (85.7 $inch^3$/min)

U-drill (milling)

Tool	Milling spindle speed	Feedrate	Material removal rate
Ø63 mm (2.5 inch)	1010 r/min	131 mm/min (5.2 ipm)	409 cm^3/min (25.0 $inch^3$/min)

Face milling

Tool	Milling spindle speed	Radial cutting depth	Feedrate	Material removal rate
Ø80 mm (3.1 inch)	1100 r/min	5 mm (0.2 inch)	1117 mm/min (44.0 ipm)	357 cm^3/min (21.8 $inch^3$/min)

End milling

Tool	Milling spindle speed	Radial cutting depth	Feedrate	Material removal rate
Ø25 mm (1.0 inch)	382 r/min	25 mm (1.0 inch)	200 mm/min (7.9 ipm)	125 cm^3/min (7.6 $inch^3$/min)

Tapping

Tool	Milling spindle speed	Feedrate
M30 xP3.5 mm	212 r/min	742 mm/min (29.2 ipm)

Left Spindle and Right Spindle

Both left spindle and right spindle are capable of high accuracy C-axis control* and can perform various machining functions including turning, milling and synchronized cutting on the right spindle using a single set up.

Milling Spindle

High speed milling spindle with high output power torque provides superior machining performance when performing both heavy duty cutting and high speed milling of nonferrous materials.

* Left spindle : 0.0001˚, Right spindle : 0.001˚

Spindle Power-Torque Diagram

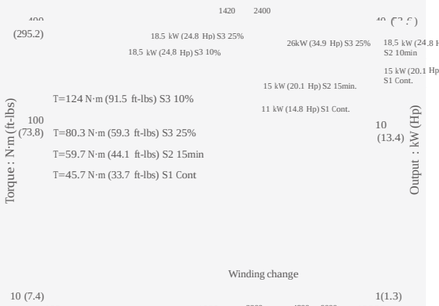
Both turning and milling spindles have powerful heavy-duty built-in type motors to maximize productivity.

PUMA SMX2600 Left spindle

PUMA SMX3100 Left spindle

PUMA SMX2600/3100 Right spindle

PUMA SMX2600/3100 Milling spindle

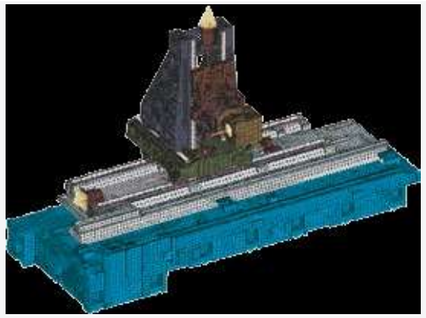


High-rigidity Machine Construction

Maintains high-rigidity through structural analysis design and provides powerful cutting performance.

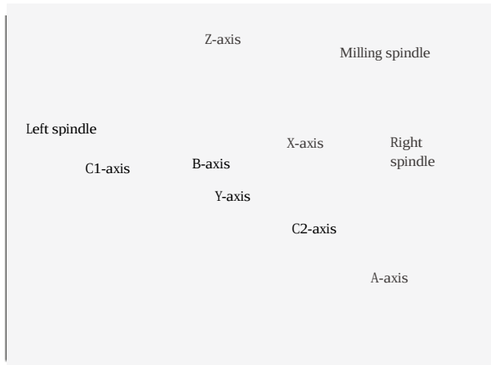
Robust Design

FEM (Finite Element Method) analysis results in superior machine stability. All guideways are sealed with a protective covers, preventing high temperature chips and coolant from contacting the guideways, thus maintaining unsurpassed long-term accuracy.



Fast Feed Axis

Extended axis travel distance and improved rapid traverse rate improves workpiece machining and provides excellent productivity.



Travel	
X-axis	630 mm (24.8 inch)
Y-axis	300 (±150) mm (11.8 (5.9) inch)
Z-axis	1585 mm (62.4 inch)
A-axis	1605 mm (63.2 inch) ⌜ 1562 mm (61.5 inch) ▪
B-axis	240 (±120) deg

Rapid traverse rate	
X-axis	48 m/min (1889.8 ipm)
Y-axis	36 m/min (1417.3 ipm)
Z-axis	48 m/min (1889.8 ipm)
A-axis	30 m/min (1181.1 ipm) ‴
B-axis	40 r/min

⌜ Right spindle ▪ Servo tail stock ‴ Right spindle (Servo tail stock is not applicable)

Optimal Applications of High Productivity

Complex machining capabilities of the PUMA SMX series enable machining over a wide range of applications in various industries, such as aerospace, energy, shipbuilding, medical, etc.

A wide range of applications based on high productivity

Drill bits
Industry I Energy
Size I D165 X D175
Material I Stainless steel
Tools I 15

Shaft
Industry I General
Size I D150 X L350
Material I Aluminum
Tools I 14

Die roller
Industry I Medical
Size I D185 X L330
Material I Aluminum
Tools I 9

Valve
Industry I General
Size I D300 X L450
Material I Stainless steel
Tools I 6

Large Machining Area

Expands machining capacity using an orthogonal structure and enables machining of large size workpieces through the extended turning diameter.

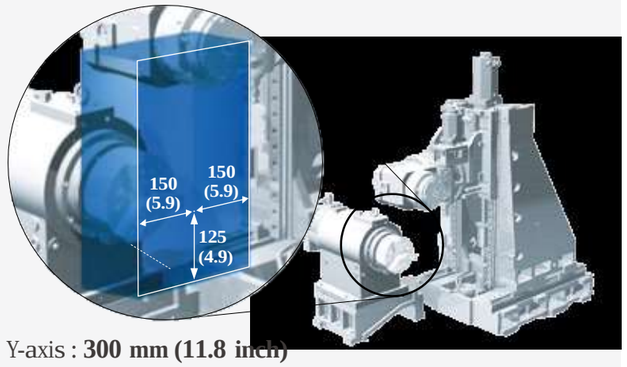
Maximized Y-axis Mmachining Area Using Orthogonal Structure Design

Maximized Y-axis machining area because of orthogonal structure design allows the machining of a wide range of workpieces.

Unit : mm (inch)

Y-axis machining area
300 mm
(11.8 inch)

X-axis : **630 mm (24.8 inch)**



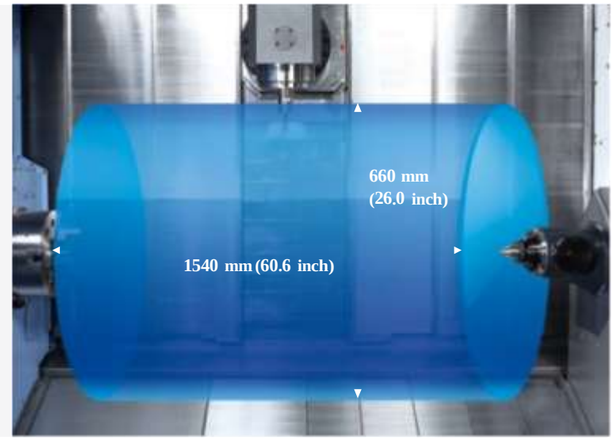
Y-axis : **300 mm (11.8 inch)**

Extended Machining Area

The extended machining area allows machining of large diameter and long workpieces.

Maximum machining diameter
660 mm
(26.0 inch)

Maximum machining length
1540 mm
(60.6 inch)

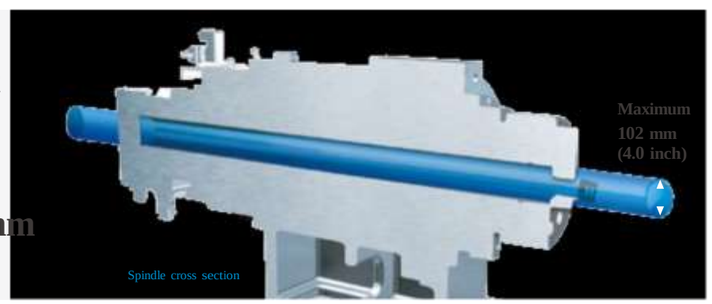


Large Bar Working Diameter

Both SMX2600 and 3100 models provide large bar diameter capacity through the spindle drawtube.

PUMA SMX2600
81 mm
(3.2 inch)

PUMA SMX3100
102 mm
(4.0 inch)



Enhanced Precision through High Accuracy Control Functions

PUMA SMX series supports higher accuracy machining by reducing thermal deformation and by using 0.0001° B-axis and C-axis accuracy control technologies.

Optimal Solutions

Minimized Thermal Deformation

Minimizes thermal deformation caused by extended machining processes by using both a high performance oil cooler and applying a thermal compensation system.

High Speed/ High Precision Feed Mechanism

Minimizes non-cutting time by simultaneously implementing faster acc/dec axis movements and rapid tool change sequence.

Accuracy Control Function

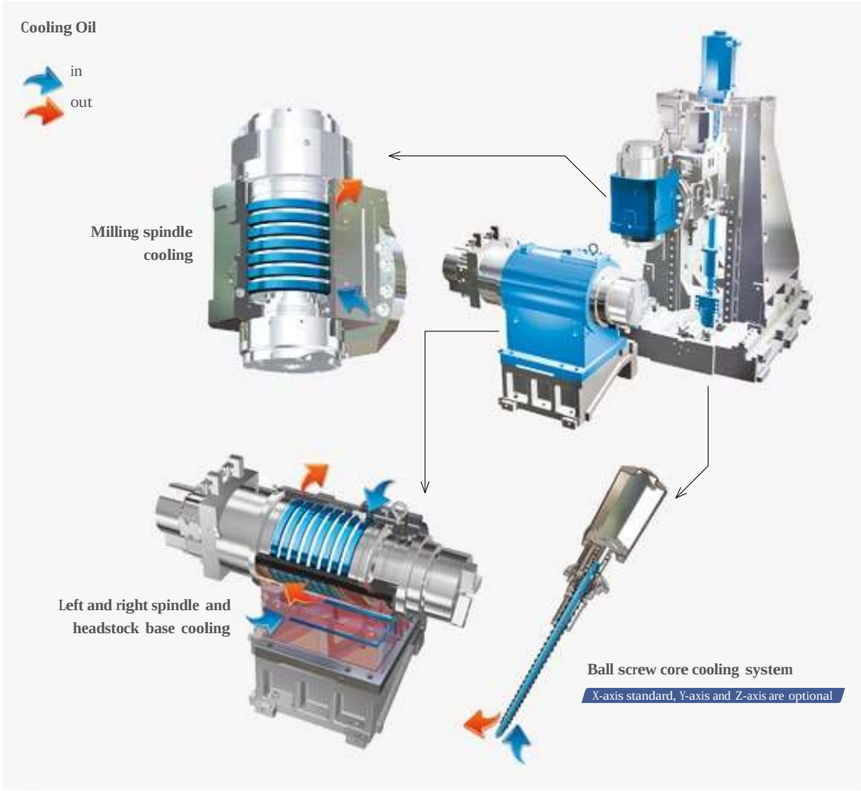
Various control functions enable accurate B-axis control, and the 240 ° rotary B-axis heavy duty milling spindle significantly enhances the milling capability on angular surfaces.

Minimized Thermal Deformation

Thermal deformation is minimized by using a high performance oil cooler and by applying a symmetrical machine structure. This ensures superior accuracy over extended machining operations.

Minimization of Thermal Deformation by Oil Cooling

Spindle and ball screw core cooling system minimizes thermal deformation during long machining processes and enhances high accuracy performance.

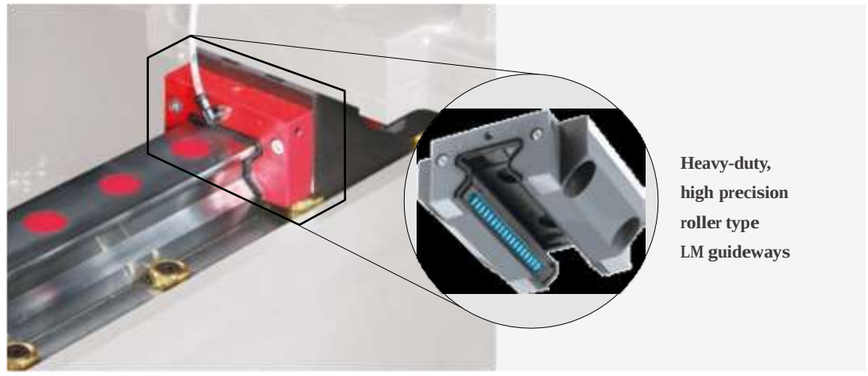


High Speed/ High Precision Feed Mechanism

Achieves higher speed and more accurate machining by employing an axis feed system equipped with a roller type LM guideways.

High Precision Roller Type LM Guideways

By employing SP class roller guideways, high positioning accuracy and high axis feedrates are achieved, thus minimizing non-cutting time.



Heavy-duty, high precision roller type LM guideways

Accuracy Control Function

Provides excellent performance for high precision operations by adopting 0.0001° B-axis and C-axis increment accuracy control functions.

240° B-axis Rotation Range

Various B-axis control functions enable accurate control and 240° rotary heavy-duty milling spindle provides accurate, heavy duty milling on angular surfaces.

B-axis Control Functions

Random position brake

Total control and precision within the 360° powerful random angle controlled brake

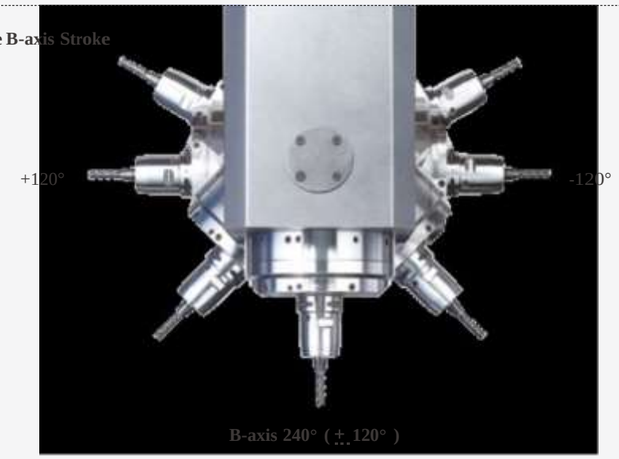
Full close feedback

Controlling B-axis up to 0.0001° by directly connecting a high precision rotary encoder

Dual step brake

Applying the powerful B-axis fix feature that controls brake dynamics using dual pressure

Large B-axis Stroke



B-axis Accuracy Control Mechanism

B-axis is accurately controlled by a servo motor and a high-rigidity, a high precision roller type gear cam.

Roller type gear cam

Excellent High Precision C-axis

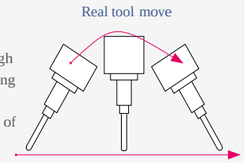
A high precision spindle position compensation sensor has been adopted that significantly enhances positioning accuracy of the rotation axis. This achieves excellent machining surface and profile accuracy when performing contour milling by applying the 0.0001° C-axis control function.

Providing 5-axis Complex Machining Capabilities (Standard when applying FANUC 31i-5)

Simultaneous 5-axis machining functions such as TCP* are built-in, thereby making the machining of complex shapes easier, such as an automotive engine impeller or an aero engine blade.

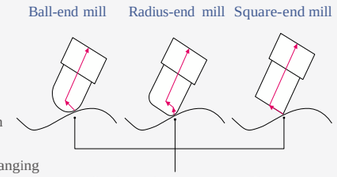
Tool Center Point Control

- Facilitating the high precision machining of the surface by automatic control of tool path
- Decreasing the time for the machining setup and the cutting process



3-D Cutter Compensation

- Increasing the productivity by automatically compensating when using various tool tips without changing the machining program
- Performing effective tool correction



* TCP : Tool Center Point

Circularity Test

By performing extended test procedures of individual machine elements and detailed analysis of results, the SMX series achieves a high level of precision and reliability that fulfills customer satisfaction.

Turning (O.D. machining)

90°

PUMA SMX2600

180° 0°

0.5 µm

270°

Material	Aluminium
Tool	Diamond tool (Nose radius 0.5 min (0.02 in.))
Spindle speed	3000 r/min
Feedrate	0.5 mm/rev (0.02 ipr)

Milling (X-Y plane)

90°

PUMA SMX2600

180° 0°

3.2 µm

270°

Material	Aluminium
Tool	End mill Ø20 mm (0.787 in.)
Spindle speed	8000 r/min
Feedrate	2500 mm/min (98.4 ipm)

* This test is performed under Doosan Machine Tool's test environment.

Optimal Applications of Accuracy

Wide range of workpieces based on high precision

Stable control technology and excellent level of accuracy enables delicate and detailed workpiece machining.

Housing
Industry I General Machinery
Size I D150 X L300
Material I Aluminum
Tools I 19

Impeller
Industry I Aerospace
Size I D120 X L80
Material I Aluminum
Tools I 6

Barrel
Industry I Electronics
Size I D70 X L50
Material I Aluminum
Tools I 50

Bucket blade
Industry I Energy
Size I 85t x D120 x L600
Material I Stainless steel
Tools I 8

Easy and Convenient Operation through Ergonomic Design

The PUMA SMX series adopts an ergonomic design with consideration for the operator in mind. Enhanced accessibility to the machine working area, easy to use control and maintenance functions significantly enhance the operator's efficiency.

Optimal Solutions

Ergonomic Design

By considering the operator's working environment and required range of movements, the machine functionality and visual appearance has been optimized.

Enhanced Operability

Close attention to the working environment and use of improved maintenance functions and accessibility have reduced the MTTR (Mean Time to Repair).

Easy and Convenient ATC-MAGAZINE Operation Panel

Enables easy checking, control and recovery of the magazine condition using the separate ATC-MAGAZINE operation panel which includes an easy to use touch screen.

Ergonomic Design

Maximizes operator's convenience by employing an operator-focused ergonomic design.

Ease of Machine Setup through Ergonomic Design

By laying out the operation panel and tool magazine in a user-friendly way, tooling and workpiece setup become easier for the operator.

1.
Operation panel with side-to-side movement, swivel action and adjustable height

Swivel angel adjustment : 100°
Height adjustment : 190 mm (7.5 inch)
Longitudinal movable : 1350 mm (53.1 inch)

2.
Front located tool magazine

Enables the operator to e check and replace tools

Max. tool length	**450 mm (17.7 inch)**
Max. tool weight	12 kg (26.5 lb)
Max. tool diameter [Continuous]	90 mm (3.5 inch)
Max. tool diameter [Adjacent pots are empty]	130 mm (5.1 inch)

3.
Convenient ATC-MAGAZINE operation panel

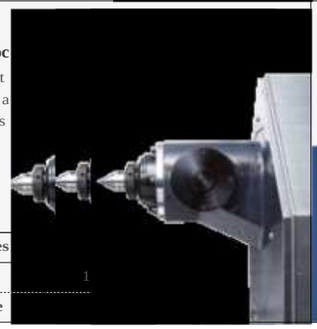
Easy ATC and magazine condition ch by using a touch screen

4.
Easy access for the operator to the spindle through the angled style exterior front cover

Minimum distance for operator reach to red fatigue

5.
Servo tail stoc

Enables the fast tail stock using a motor and ball s



PUMA SMX series	
Travel	1
Max. thrust force	

6.
Extended front window

Enables the operator to easily monitor the machining operation using the large front window

Award

An excellently designed PUMA SMX series has received the world's leading design awards, such as **the 2014 German Red Dot**, **the 2013 Australian AIDA** (Australian International Design Award), **the 2013 Korean Good Design**, etc. Thus, it is internationally recognized for its shape, function, quality, safety sustainability and innovation.

Ease of Operation and Maintenance

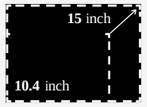
Enhances ease of operation by the design based on the operator's functions and also

functions that reduce downtime by decreasing the MTTR.*

User-friendly Operation Panel

The operator panel is designed to provide easy operation and also maintenance functions to reduce downtime. A large size 15-inch screen is applied as standard on the customized operator panel.

15-inch wide screen display unit



Optimized system design that reflects Doosan's know-how from long-term experience and the customer's needs

A design for easy operation	easy and convenient user interface, enhanced lamp visibility, optimized button size for easy operation and long life, use of a partition-type layout to prevent incorrect button operation
Addition of simple option buttons	additional function buttons can be easily fitted to spare sections of the operator panel
Customized function support	attachment of customized function switches and customized additional panel design

Simple Alarm Function

Doosan's EOP* system enables the user to operate the NC* system more conveniently.

Alarm Guide Function

- Alarm notification for user check-up

- Alarm notification of actuator and sensor status

Easy check-up of alarm status and troubleshooting problems by access to 3D displays of internal mechanisms

Periodic Maintenance Notification Function

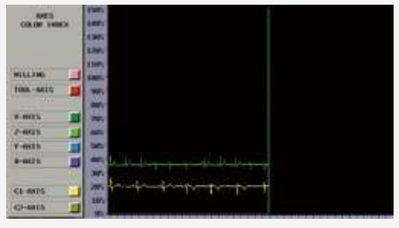
- Avoids unexpected downtime
- Reduces maintenance cost
- Increases production efficiency
- Optimizes the performance

Manages and extends the lifespan of cutting tools

* EOP : Easy Operation Package / NC : Numerical Control

Tool Load Monitoring

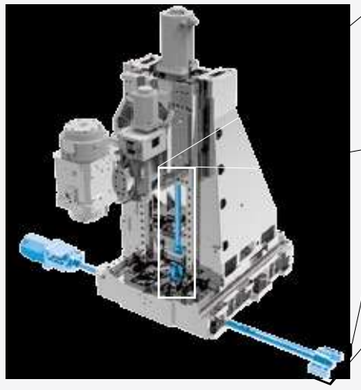
It is possible to display various types of information about each tool and to monitor the tool load in real-time.



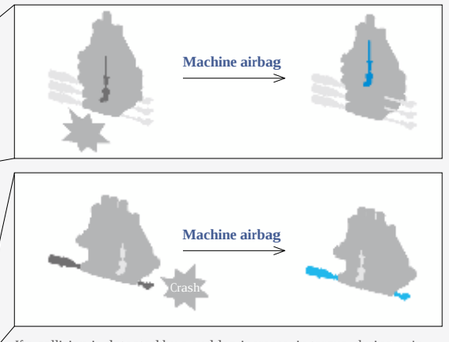
* MTTR : Mean Time to Repair

Machine Airbag Function

Machine airbag function minimizes damage in the event of a machine collision, defect or heavy load by detecting sudden axis load increase.



The Principle of Machine Airbag Function



If a collision is detected by a sudden increase in torque during axis movement, the servo motor immediately moves in reverse to partially retract the cutter.

Easy and Convenient ATC - MAGAZINE Control Function

Provides ease of operation of the ATC* - MAGAZINE control function using a separate touch screen.

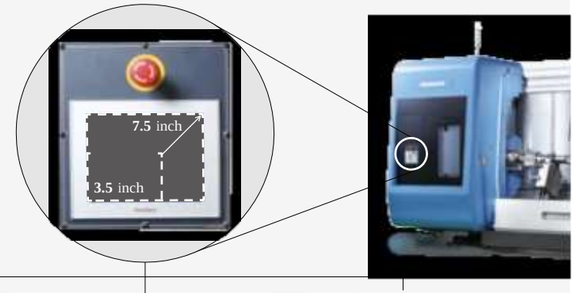
ATC-MAGAZINE Operation Panel

The status of ATC and the tool magazine unit are identified visually by using a graphic touch panel display and touch operation. The touch screen also operates the ATC, the tool magazine and the tool feed pot carrier individually.

Enlarged touch screen panel is available as an option

7.5 inch

Standard: 3.5 inches / Optional: 7.5 inches



Display and touch operation

Displays ATC – MAGAZINE related information and supports manual operation by touchscreen. 7.5-inch large screen specification is available for the ATC – MAGAZINE operation panel.

Capable of photographing and recording

Includes black box function that photographs and stores the image as the ATC mechanism operates. An additional function can be added that records the ATC internal state using a surveillance camera and displays the operation on the screen.

Tool information display

Improves the tool management by saving and displaying useful tool related information.

* ATC : Auto Tool Changer

Various Optional Equipment

Various options to satisfy the customers requirements can be selected and applied.

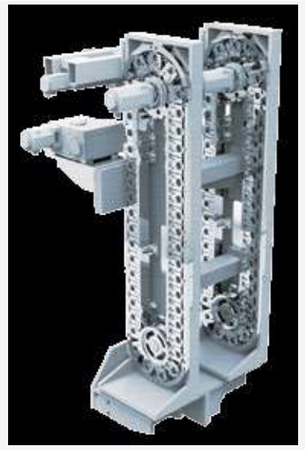
≅ Standard ≠ Optional X Not applicable

NO.	Division	Option		PUMA SMX 2600	PUMA SMX 3100	PUMA SMX 2600S	PUMA SMX 3100S
1	Tool shank	CAPTO C6		≅	≅	≅	≅
2		HSK-A63		≠	≠	≠	≠
3	Automatic Tool Changer	3.5" operation touch panel		≅	≅	≅	≅
4		7.5" operation touch panel with camera		≠	≠	≠	≠
5	Tool magazine	40 tools		≅	≅	≅	≅
6		80 tools		≠	≠	≠	≠
7	Work holding device	Hyaraulic chuck-1	Left spindle (10")	≅	X	≅	X
8			Left spindle (12")	≠	≅	≠	≅
9			Left spindle (15")	X	≠	X	≠
10		Hyaraulic chuck-2	Right spindle (10")	X	X	≅	≅
11			Right spindle (12")	X	X	≠	≠
12		Dual pressure chucking		≠	≠	≠	≠
13		Chuck clamp confirmation		≠	≠	≠	≠
14		Chuck pressure check switch		≠	≠	≠	≠
15		Servo driven type Steady rest (SLU3.1 ~ SLU5)		≠	≠	≠	≠
16	Coolant	T-T-C* (Milling spindle)	Pressure 1.0 Mpa (145 psi) / bag filter	≅	≅	≅	≅
17			Pressure 2.0 Mpa (290 psi) / element-turbulance filter	≠	≠	≠	≠
18			Pressure 7.0 Mpa (1015 psi) / element-turbulance filter	≠	≠	≠	≠
19			Pressure 7.0 Mpa (1015 psi) / paper filter	≠	≠	≠	≠
20			MQL (Minimum quantity lubrication) system	≠	≠	≠	≠
21		Oil skimmer		≠	≠	≠	≠
22		Coolant pressure switch		≠	≠	≠	≠
23		Coolant level switch		≠	≠	≠	≠
24	Chip disposal	Chip conveyor (right disposal)		≠	≠	≠	≠
25		Chip bucket		≠	≠	≠	≠
26		Air blower for chuck		≠	≠	≠	≠
27		Chuck coolant		≠	≠	≠	≠
28		Through spindle coolant (Spindle-1 / Spindle-2)		≠	≠	≠	≠
29		Coolant gun		≠	≠	≠	≠
30		Air gun		≠	≠	≠	≠
31		Mist collector		≠	≠	≠	≠
32	High accuracy	Thermal compensation		≅	≅	≅	≅
33		Ball screw core cooling (X-axis)		≅	≅	≅	≅
34		Ball screw core cooling (Y/Z-axis)		≠	≠	≠	≠
35		Coolant chiller (temperature control)		≠	≠	≠	≠
36		Linear scale feed back (X/Z/Y-axis)		≠	≠	≠	≠
37	Measurement	Auto tool setter		≠	≠	≠	≠
38		Auto workpiece measurement (RMP60)		≠	≠	≠	≠
39		Axiset check-up (Receiver / Reference sphere/ Software)		≠	≠	≠	≠
40	Automation	Parts unloader and conveyor		X	X	≠	≠
41		Workpiece ejector		X	X	≠	≠
42		Bar feeder interface		≠	≠	≠	≠
43		Automatic front door (with safety device)		≠	≠	≠	≠
44	Others	Doosan tool monitoring system		≅	≅	≅	≅
45		Rotary type window wiper		≠	≠	≠	≠

* T-T-C : Through - Tool - Coolant

80 Tools Magazine option 6

The tool magazine capacity can be increased up to 80 tools with no increase of the machine floor area.



Oil Skimmer option 21

An oil skimmer with high quality oil-water separating performance maximizes cutting oil's lifespan.

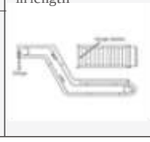
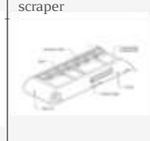
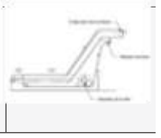
Servo-type Steady Rest option 15

This equipment supports long workpieces during the machining process.
Linear positioning of the steady rest is achieved by servo motor and ball screw and can be positioned during cycle.

Options
- SLU-3.1 : Ø20 ~ Ø165 mm (0.8 ~ 6.5 inch)
- SLU-3.2 : Ø50 ~ Ø200 mm (2.0 ~ 7.9 inch)
- SLU-4 : Ø35 ~ Ø245 mm (1.4 ~ 9.6 inch)
- SLU-5 : Ø50 ~ Ø310 mm (2.0 ~12.2 inch)

Chip Conveyor (Right side exit) option 24

The conveyor provides a superior chip removal system and is designed with a stable structure for easy maintenance and reduced leakage. By selecting the correct type of conveyor, the efficiency of the machine working area is increased.

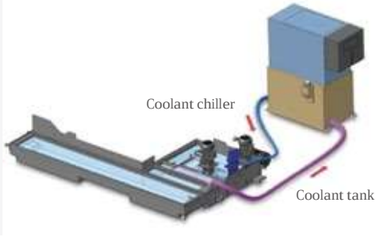
Name	Hinge Belt	Magnetic Scraper	Drum filter Single	Drum filter Double
Application	For steel	For castings	For castings	For steel, castings, nonferrous metal
Features	- Standard - Appropriate for a heavy material chip of more than 30 mm in length	- Easy maintenance - Eject the chip by scraping and raising the chip with the scraper	- Appropriate for the sludge - Not proper for non-ferrous metal	- Appropriate for both a long and a short chip - Filtering coolant
Shape				

Tool Setter (Automatic) option 37

Auto linear motion type tool setter has been installed for tool measurement and tool wear detection. It is stored in a safe location during the machining process, and can be activated with the workpiece still in place in the chuck with no interference.

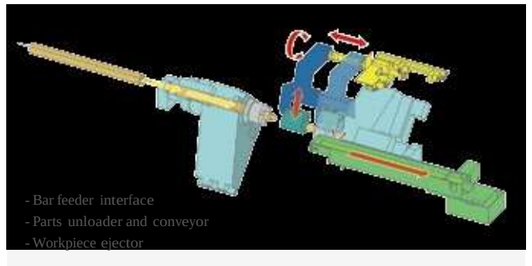
Coolant Chiller (Recommendation) option 35

A coolant chiller minimizes the thermal deformation by controlling the temperature of the return coolant to the machine, thus improving the accuracy.



Optional Equipment for Automation option 40, 41, 42

Various peripheral equipment is available to support the SMX to improve its performance and productivity.

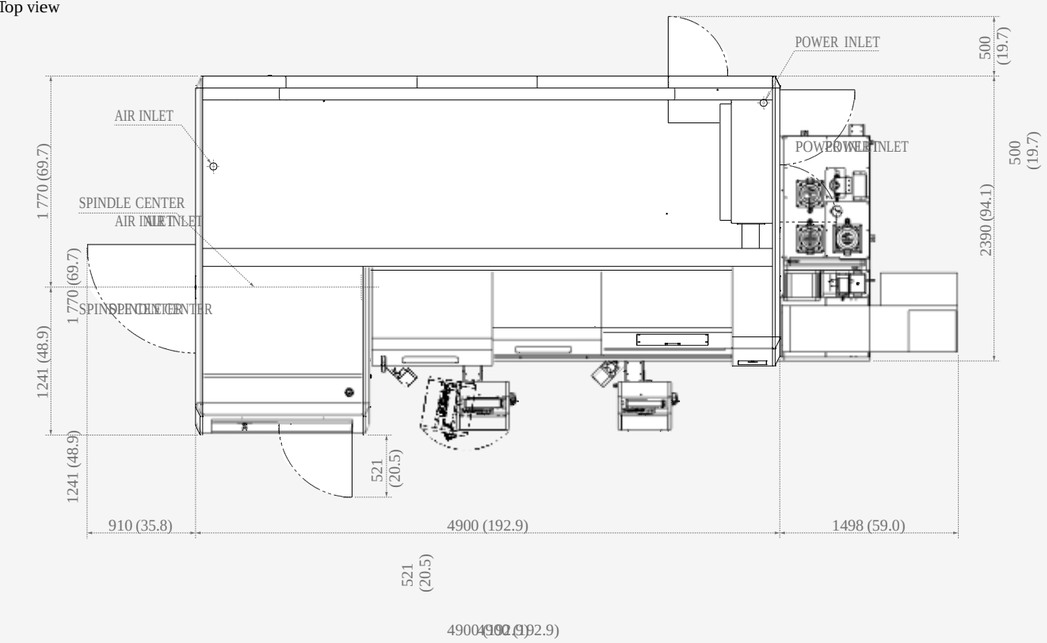


External Dimensions

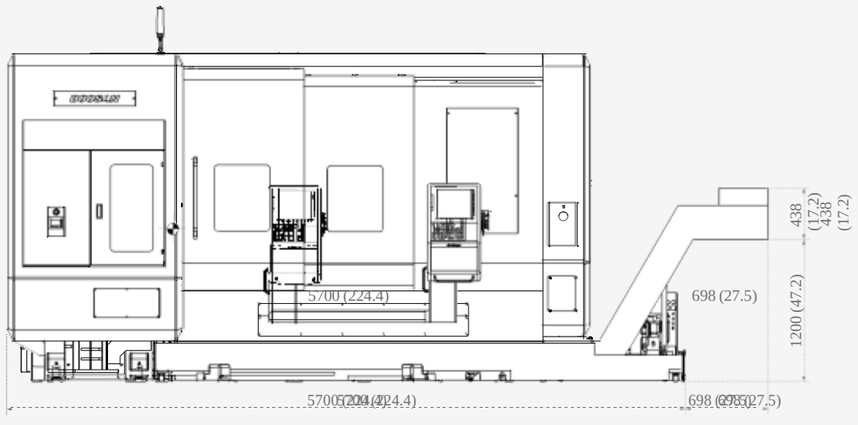
PUMA SMX2600/3100 (40/80 Tools)

Unit : mm (inch)

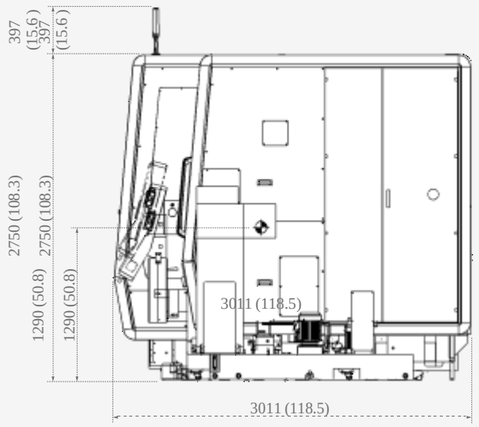
Top view



Front view



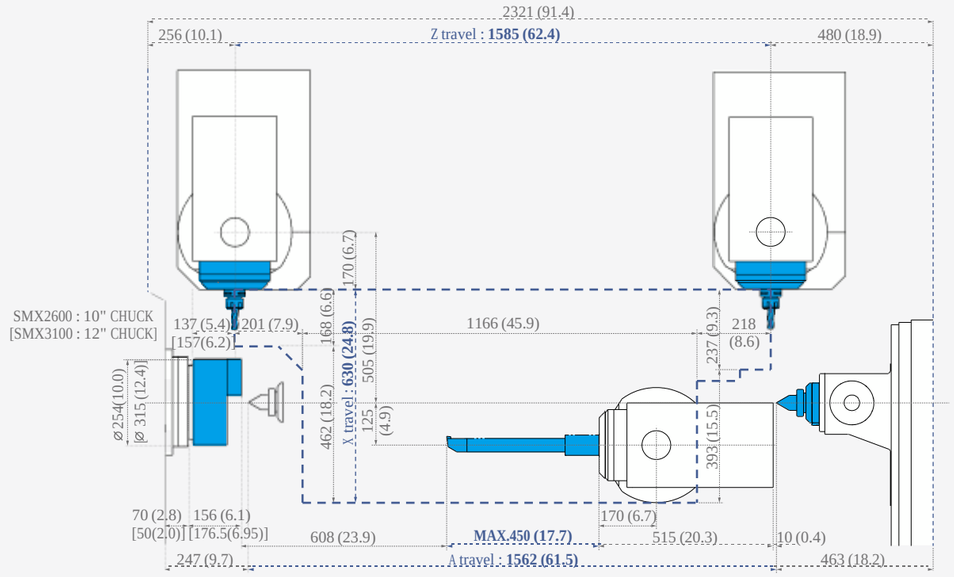
Side view



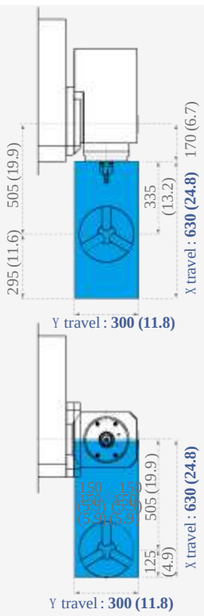
Working Range

PUMA SMX2600/SMX3100

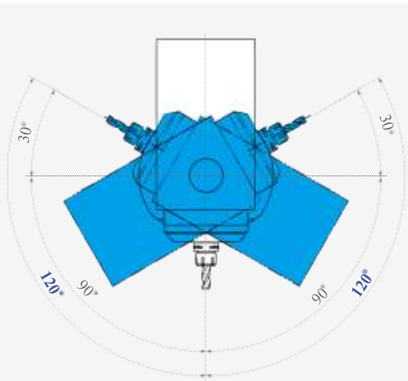
Entire range — Unit : mm (inch)



Y-axis working rage — Unit : mm (inch)



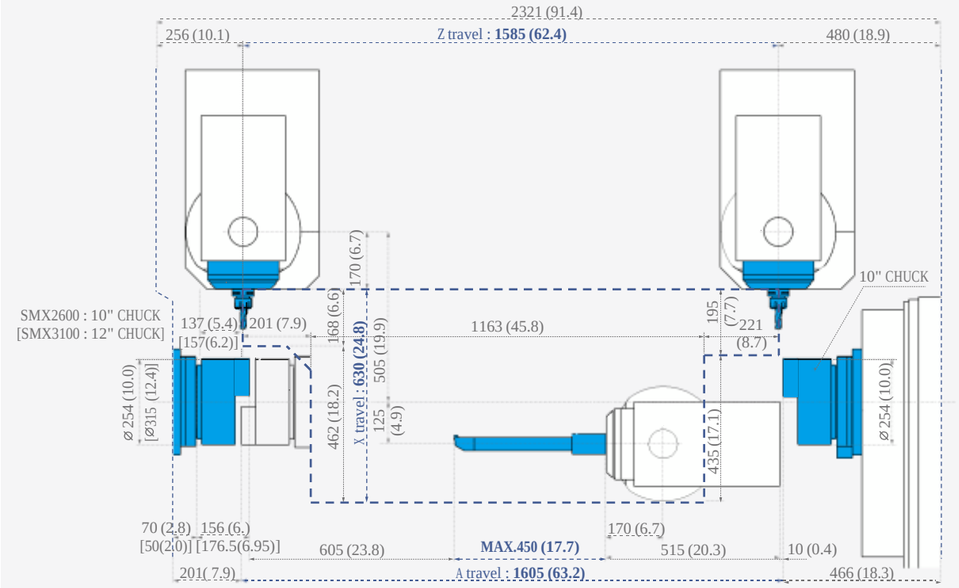
B-axis rotating range — Unit : mm (inch)



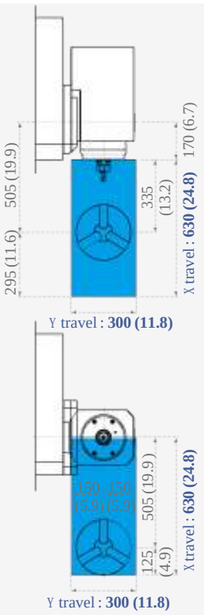
PUMA SMX2600/3100	X	630 mm (24.8 inch)
	Y	300 mm (11.8 inch)
	Z	1585 mm (62.4 inch)
	A	1562 mm (61.5 inch)
	B	240 deg

PUMA SMX2600S/SMX3100S

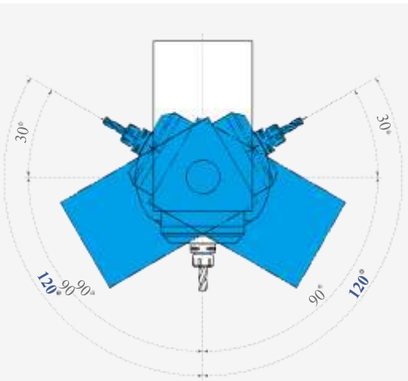
Entire range — Unit : mm (inch)



Y-axis working rage — Unit : mm (inch)



B-axis rotating range — Unit : mm (inch)



PUMA SMX2600S/3100S	X	630 mm (24.8 inch)
	Y	300 mm (11.8 inch)
	Z	1585 mm (62.4 inch)
	A	1605 mm (63.2 inch)
	B	240 deg

Machine Specifications

Standard Features

- Tool and tool box
- Through spindle coolant for milling spindle
- Door interlock
- Level bolt and plate
- Servo tail stock (Except PUMA SMX2600S/3100S)
- Soft jaws
- Spindle head cooling system
- Hydraulic unit
- Automatic coolant system
- Work lamp
- Standard hydraulic chuck

Item			Unit	PUMA SMX2600	PUMA SMX3100	PUMA SMX2600S	PUMA SMX3100S
Capacity	Swing over bed		mm (inch)	660 (26.0)			
	Recom. turning diameter		mm (inch)	255 (10.0)	315 (12.4)	255 (10.0)	315 (12.4)
	Max. turning diameter		mm (inch)	660 (26.0)			
	Max. turning length		mm (inch)	1540 (60.6)			
	Chuck size	Left spindle	inch	10	12	10	12
		Right spindle	inch	-		10	
	Bar working diameter		mm (inch)	81 (3.2)	102 (4.0)	81 (3.2)	102 (4.0)
Travels	Travel distance	X-axis	mm (inch)	630 (24.8)			
		Y-axis	mm (inch)	300 (±150) (11.8 (±5.9))			
		Z-axis	mm (inch)	1585 (62.4)			
		A-axis	mm (inch)	1562 (61.5)		1605 (63.2)	
		B-axis	deg	240 (±120)			
		C1-axis	deg	360			
		C2-axis	deg	-		360	
	Rapid traverse rate	X-axis	m/min (ipm)	48 (1889.8)			
		Y-axis	m/min (ipm)	36 (1417.3)			
		Z-axis	m/min (ipm)	48 (1181.1)			
		A-axis	m/min	-		30	
		B-axis	r/min	40			
		C1-axis	r/min	200			
		C2-axis	r/min	-		200	
Left spindle	Max. spindle speed		r/min	4000	3000	4000	3000
	Spindle nose		ASA	A2-8	A2-11	A2-8	A2-11
	Spindle bearing diameter (Front)		mm (inch)	130 (5.1)	160 (6.3)	130 (5.1)	160 (6.3)
	Spindle through hole		mm (inch)	91 (3.6)	115 (4.5)	91 (3.6)	115 (4.5)
	Min. spindle indexing angle (C axis)		deg	0.0001		0.0001	
Right spindle	Max. spindle speed		r/min	-		4000	
	Spindle nose		ASA	-		A2-8	
	Spindle bearing diameter (Front)		mm (inch)	-		130 (5.1)	
	Spindle through hole		mm (inch)	-		91 (3.6)	
	Min. spindle indexing angle (C axis)		deg	-		0.001	
Milling spindle	Max. spindle speed		r/min	12000			
	Min. spindle indexing angle (B axis)		deg	0.0001			
Automoatic Tool Changer	Tool storage capa. (Max.)		ea	40/{80}*			
	Tool shank		-	CAPTO C6 {HSK-A63}*			
	Max. tool diameter continous		mm (inch)	90 (3.5)			
	Max. tool diameter without adjacent tools		mm (inch)	130 (5.1)			
	Max. tool length		mm (inch)	450 (17.7)			
	Max. tool weight		kg (lb)	12 (26.5)			
	Tool change time (T-T-T)	Tool-to-tool	sec	1.8			
		Chip-to-chip	sec	7.8			
Tail Stock	Quill bore taper		MT	#5		-	
	Quill travel		mm (inch)	1562 (61.5)		-	
Motors	Left spindle motor power (30min/Cont.)		kW (Hp)	26 (34.9) / 22 (29.5)	30 (40.2) / 25 (33.5)	26 (34.9) / 22 (29.5)	30 (40.2) / 25 (33.5)
	Right spindle motor power (30min/Cont.)		kW (Hp)	-		26 (34.9) / 22 (29.5)	
	Milling spindle motor power (2.5min/10min/Cont.)		kW (Hp)	26 (34.9) /18.5 (24.8) /15 (20.1)			
	Coolant pump motor power		kW (Hp)	2.2 (3.0)			
Power source	Electric power supply (rated capacity)		kVA	64.61	67.61	89.91	94.71
Machine Dimensions	Height		mm (inch)	2761 (108.7)			
	Length		mm (inch)	4900 (192.9)			
	Width		mm (inch)	3011(118.5)			
	Weight		kg (lb)	15800 (34832.5)	16300 (35934.8)	16200 (35714.4)	16700 (36816.7)
Control	NC system			FANUC 31i {FANUC 31i-5}*			

* { } : Option

NC Unit Specification

FANUC 31i/31i-5

AXES CONTROL
- Controlled axes X1, Z1, C1, Y, B, A, Z2, C2
- Simultaneous controlled axes 4 (5-Only for FANUC 31i-5)axes
- Backlash compensation for each rapid traverse and cutting feed
- DNC Operation with Memory card
- HRV2 control
- Inch / Metric conversion
- Interference chek for rotary area
- Least input command 0.0001 mm/inch
- Stored pitch error compensation
- Stored stroke check 1
- Synchronous / Composite control
- Tool direction handle feed (G68.1)
- Torque control
- Unexpected disturbance torque detection function

INTERPOLATION FUNCTIONS
- 1st. Reference position return Manual, G28
- 2nd. Reference position return G30
- 3rd / 4th Reference position return
- AICC (Number of lookhead block : 30 Blocks)
- Continuous threading
- Cylindrical interpolation
- Multiple threading
- Nano interpolation
- Polar coordinate interpolation
- Polygon machining with two spindle
- Skip G31
- Thread cutting / Synchronous cutting
- Torque limit skip

AUXILIARY / SPINDLE SPEED FUNCTION
- Constant surface speed control
- M-code function M3 digits
- Multi spindle control
- Rigid tapping
- S-code function S4 / S5 digits
- Spindle orientation
- Spindle synchronous control

PROGRAM INPUT
- 3D coordinate conversion
- Canned cycle for turning
- Circular interpolation by R programming
- Coordinate system setting G50
- Coordinate system shift
- Custom macro
- Diameter / radius programming (X-axis)
- Direct drawing dimension programming
- Direct input of coordinate system shift
- G code system A
- G code system B/C
- Multiple repetitive canned cycle G70 - G76
- Multiple repetitive canned cycle II
- Plane selection G17, G18, G19
- Programmable data input G10
- Tape code : ISO / EIA auto recognition EIA RS422/ISO840
- Tape format for FANUC series15
- Work coordinate system G52 - G59

TOOL FUNCTION / TOOL COMPENSATION
- Automatic tool offset
- Direct input of offset value measured B
- Tool center point control by 5-axes only FANUC 31i-5
- Tool geometry / Wear compensation
- Tool life management
- Tool monitoring system
- Tool nose radius compensation
- Tool offset G43, G44, G49

Product Overview

- Tool offset pairs
- Y-axis offset

EDITING OPERATION
- Memory card program edit & operation
- Number of registered programs
- Part program storage size
- Program protect

SETTING AND DISPLAY
- Multi-language display
- Operation history display
- Periodic maintenance screen
- Run hours / Part count display
- Self-diagnosis function

DATA INPUT / OUTPUT
- Automatic data backup
- External work number search
- Memory card & usb input / output
- Reader / Puncher interface
- RS232C interface
- Screen hard copy

OTHERS
- Display unit
- DNC operation (Reader / Puncher interface is required)
- Ethernet function
- Reference position shift

OPERATION GUIDANCE FUNCTION
- EZ Guide-i (Conversational programming solution)

OPTIONAL SPECIFICATIONS

INTERPOLATION FUNCTIONS
- Circular threading
- High speed skip
- Multi step skip
- Variable lead threading

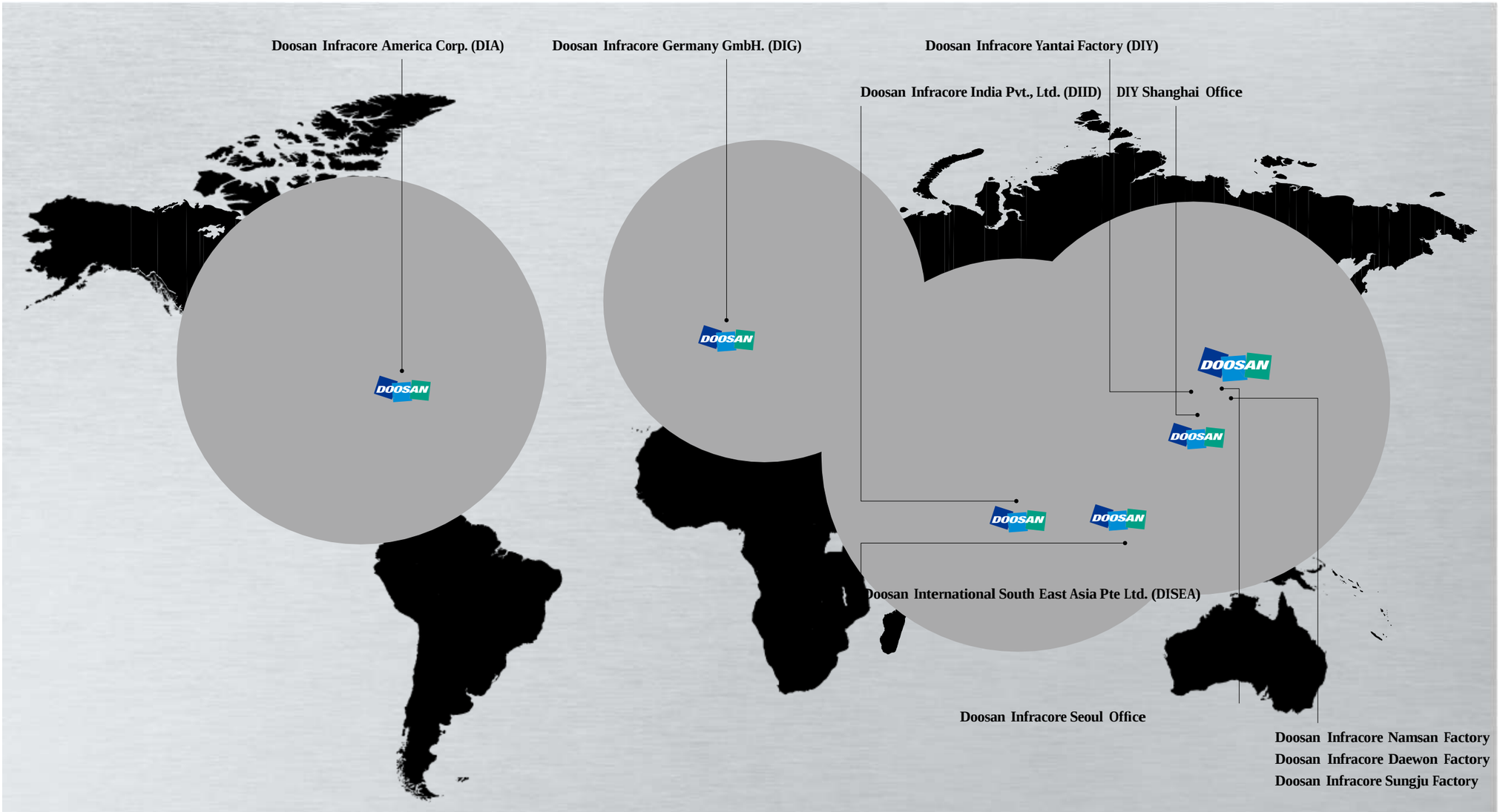
OPERATION
- Manual handle interruption
- Tool retract and recover

PROGRAM INPUT	**Feature**	
- Addition of workpiece coordinate system pair	High Productivity High Accuracy	48 pairs
- Interruption type custom macro	Easy Operation	
- Optional block skip (Includs software operators panel)		9 piece
- Pattern data input	**Technical Information**	
- Work coordinate system preset	Options	
	Capacity Diagram	
EDITING OPERATION	Specification	
- Part program storage size	**Customer Support**	1MB / 2MB
- Play back	**Service**	
DATA INPUT/OUTPUT		
- Data server		
- NC control		
CONTOURING FUNCTION		
- High speed machining (600 blocks)		
ROBOT INTERFACE		
- Robot interface with PMC I / O module (Hardware between PMC I / O mudules)		
- Robot interface with PROFIBUS-DP		

Responding to Customers Anytime, Anywhere

Doosan Machine Tools' Global Network, Responding to Customer's Needs nearby, Anytime, Anywhere

Doosan machine tools provides a system-based professional support service before and after the machine tool sale by responding quickly and efficiently to customers' demands. By supplying spare parts, product training, field service and technical support, we can provide top class support to our customers around the world.



Global Service Support Network

Corporations	Dealer Networks	Technical Centers	Factories
5	128	21	4

Technical Center: Sales Support, Service Support, Parts Support

Domestic Service Support Network

Integrated Support Centers	Sales Branch Offices	Post-Sales Service Centers	Designated Repair Service Centers
2	7	6	31

Customer Support Service

We help customers to achieve success by providing a variety of professional services from pre-sales consultancy to post-sales support.

Supplying Parts

- Supplying a wide range of original Doosan spare parts
- Parts repair service

Field Services

- On site service
- Machine installation and testing
- Scheduled preventive maintenance
- Machine repair

Technical Support

- Supports machining methods and technology
- Responds to technical queries
- Provides technical consultancy

Training

- Programming / machine setup and operation
- Electrical and mechanical maintenance
- Applications engineering

Product Specification

PUMA SMX series

Specification	PUMA SMX2600	PUMA SMX3100	PUMA SMX2600S	PUMA SMX3100S
Chuck size	10 inch	12 inch	10 inch	12 inch
Max. turning diameter	660 mm (26.0 inch)		660 mm (26.0 inch)	
Max. turning length	1540 mm (60.6 inch)		1540 mm (60.6 inch)	
Spindle speed	4000 r/min	3000 r/min	4000 r/min	3000 r/min
Motor power	26/22 kW (34.9 /29.5 Hp)	30/25 kW (40.2 / 33.5 Hp)	26/22 kW (34.9 /29.5 Hp)	30/25 kW (40.2 / 33.5 Hp)
Machine dimensions (Length X Width X Height)	4900 x 3011 x 2761 mm (192.9 x 118.5 x 108.7 inch)		4900 x 3011 x 2761 mm (192.9 x 118.5 x 108.7 inch)	

Doosan Machine Tools

www.doosaninfracore.com/machinetools

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↘ For more details, please contact Doosan.
↘ The specifications and information above-mentioned may be changed without prior notice.